IMPLEMENTATION POLITICS: TOP MANAGEMENT SUPPORT AND USER INVOLVEMENT

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ABSTRACT

The 3PA system is an intriguiging study in implementation failure and success. The Production Planning and Profit Analysis system was introduced into two manufacturing plants in the same division of a company. It was readily accepted in one plant and staunchly resisted in the other, in spite of repeated managerial interventions. Eventually, however, the resisting plant gave in and began using the system. What makes this case especially interesting is that top management clearly supported the system and gave both plants the opportunity to participate in the design process; conventional wisdom, therefore, helps little to explain the early resistance in one plant. While it is true that the resisting plant did not avail itself of the proffered participation opportunity, analysis of the case data through a political perspective indicates that the lack of participation is not so much a cause of the resistance observed, but a reflection of the political situation in the company to which the resistance is more appropriately attributed. This paper describes the political perspective, applies it to the 3PA case and draws some implications for practicing system designers and implementors.

THE CASE OF THE 3 PA SYSTEM

Today, the General Manager and staff of the EP Division at JHM, Inc., believe their 3PA system to be a success. However, at various points in time over the course of system development, the outcome had not always seemed so certain. Careful planning had failed to anticipate or avoid several irritating setbacks, but these were finally overcome, through, it was believed by managers at JHM, sustained attention and managerial action. A brief history of these events follows.

When Jim Reason took over the newly-formed EP Division at JHM in late 1973, he knew he faced a challenge to his managerial abilities. The two major plants in the division, Athens and Capital City, were located 80 and 300 miles away from corporate headquarters. Each plant performed a different stage in the production of the metal aircraft parts which were the Division's major products: Athens cast the parts from molten metal and then shipped them to Capital City where they were machined and finished. But the relationships between the plants were not good, due in part to historical reasons and in part to economic ones. At one point in time, both plants had had forging operations which had competed with each other for customers. This history had politicized the relations between the plants, making cooperation and information-sharing difficult at best. Currently, because of uncertainties in its production process which created a scrap rate of 40%, Athens was rarely able to meet the production deadlines it promised Capital City. Finally, because of differences in history and technology, each plant had developed different accounting and reporting

conventions which made it difficult for them to communicate with each other and for Division Headquarters to compare reliably the figures submitted by them.

Prior to the formation of the new Division, Capital City had been part of another Division in JHM. It had been started up to handle overflow from a plant near Corporate Headquarters; it had always maintained good relations with people from JHM. It was believed to be a well-managed plant. Its profit picture was good, and it had few problems with labor unrest. Consequently, JHM did not make many attempts to intervene in its internal affairs, a situation obviously facilitated by the 300 mile distance between it and headquarters. The plant manager there prior to 1973 apparently aimed to avoid headquarters intervention at almost any cost, even the cost of suppressing information automation.

> "The old plant manager used to give as little cost information to headquarters as he could get away with. You see, he'd been burned in the past, by telling his boss some unfavorable news and having it used against him. He kept a real lid on MIS . . . He was afraid that if headquarters found out that he had certain regular accounting reports, they would demand to see them. So he allowed systems development only grudgingly and then he'd say: 'don't breathe a word of this to headquarters'."

According to Jim Reason, when he became Division Manager: "The Capital City Plant's idea of a long-range plan was three months out." Because of this, Jim Reason and his small staff expected resistance from Capital City when, immediately after taking office, he began proposing computer-based systems "to integrate the division". This fear was exacerbated by the existence of a strong, old fashioned centralized production control function at Capital City. (See Figure 1 for organizational chart.)

When the plant manager died in 1975, Jim Reason appointed Dudley, who took it as a personal challenge to bring information systems at Capital City "out of the dark ages". In this goal, he was aided by the systems people at Capital City who desired the opportunity to experiment with the state-of-the-art and to support manufacturing applications in addition to accounting applications.

Prior to the formation of the Division in 1973, Athens had had a very different history from Capital City. An autonomous company, Athens was acquired by JHM and allowed to operate on its own for ten years. In the late sixties, JHM began more active intervention into its affairs, removing its sales force and its substantial computer operations and consolidating these with other groups at the Division and Corporate level respectively. In spite of its history of labor unrest and poor management, of low profit and bad quality, Athens was quite sophistocated in computerization.

> "They had their own computer, which was really quite large for a facility of its size. The applications they developed were mostly accounting-oriented, but, around 1968, they tried an experiment in shop floor data collection."

The system in question computerized inventory control. Terminals were placed on the factory floor and trained operators entered production data into them. Three or four people were employed in the office full-time to maintain data accuracy.

In 1971, JHM sent a team of managers, including Rob Frisco, to Athens.

> "My job was to install JHM's control system, which wasn't being used at Athens. There was an inventory loss on these books over one-and-a-half million dollars. One of the first things I did was to pull out those

> computer terminals, because the reporting of inventory was woefully inaccurate . . ." I set about putting in a sound system of time-keeping and inventory control."

The "sound system of time-keeping and inventory control", was the computerized WIP (work in process) system. Many people at Athens felt this system was largely accounting-oriented and did not give enough information for effective production control. However, the WIP had the distinct advantage of eliminating from the books the over-one-million-dollar inventory loss, since that had proved to be only a paper loss, caused by improper record-keeping. People also complained that Frisco eliminated the jobs of those people who maintained inventory records, but Frisco explained that:

> ". . . this was a time of tremendous layoffs -- we let 500 people go. Without a doubt the staff functions were shorthanded. There was talk at the time of eliminating the entire MIS operation."

The Athens Plant barely survived the recession of the early seventies; it did so at the cost of severe cutbacks to staff support, especially production control.

In 1973, the EP Division was formed, and Jim Reason was appointed division manager. He selected a small staff, naming Bob Frisco his financial manager, and set about shaping up his two ill-assorted plants into a division. This process took two forms: the development of a computer-based system to integrate the plants and additional managerial intervention at Athens. Reason knew that it should be possible to forecast profit (or loss) from a forecast of sales, data about production plans and historical part cost trends. Thus was born the idea for 3PA. But such a system required consistent production control procedures throughout the Division. It was decided,

therefore, that the first priority was the development of a production control system which contained an inventory of work in process and shipping and manufacturing schedules. Reason initiated development of the PCS system within a few months of starting his job and then set about the task of turning around the performance of the Athens plant.

The latter task entailed a major reorganization of Athens' internal organizational structure in 1975 (see Figure 2). Prior to this time, Athens was structured in a functional manner, virtually identical to Capital City (see Figure 1). The reorganization carved up the plant into four product lines and distributed several staff functions across these, including engineering and inventory control. According to one source:

> "The split up into product lines was a bitch. Production control was the first one to feel the pinch. They had a feeling of lost prestige and power."

Compared to this and compared to the many horror stories in the MIS literature, the process of developing the 3PA system, which began with the development of a production control system in late 1973, was a model of good system development. According to one division staffer: "we did everything right". A planning group was formed, composed of a representative of Corporate Management Information Systems, a Sales coordinator and, from each Plant, a systems person and the production control manager. This group, subject to the review of Reason, two of his staff and the two plant managers, had the charter to develop a PCS "which will be compatible with the needs of all the personnel in the division." The planning group chose meeting sites equidistant between the plants and, for a year, held two-day sessions monthly to discuss their common and unique problems.

Representatives from the Athens Plant generally hung back in these meetings, but those from the Capital City Plant "really took the ball and ran with it." The Capital City production control manager assumed project management responsibility. Working closely with a systems person from Capital City, he developed the project team's proposal.

> "We didn't want to use conventional file management techniques. If we had done it that way, we wouldn't have the state-of-the-art and we just would have had to convert it later. Then it would never be right. We wanted to use data base management techniques. We wanted on-line processing and inquiry." (data processing specialist)

And staff managers at Capital City were anxious to see that manufacturing was supported through computer systems: all prior computerization had been applied to the accounting department. Taking stock of their needs, Capital City Plant people, from production planners to accountants to systems specialists, were unanimous in their definition of the "ideal" system.

> "I want a womb-to-tomb MRP system. Something which will take the production plan and a bill of materials and tell me when I've got to make it, and when I've got to ship it, how much to keep in inventory and when to order raw materials". (production controller)

In the middle of 1975, the planning group presented to the review committee the recommendation that the EP Division undertake development of an MRP (materials requirements planning) system using data base management technology. This system would have added an engineering bill of materials to the production schedules and inventory status of a simple production control system; it would have calculated purchasing requirements as a by-product of its operation. They

estimated a two-year completion date for the proposed system. Reason was upset and impatient with the recommendation: he had already waited a year and the proposed MRP seemed to go far beyond what was needed for divisional forecasting. The project group was directed to develop a PCS which would be ready in one year from this date.

The abbreviated schedule forced the project team to abandon much of the planned MRP, although they did receive grudging approval to use the data base technology that would enable linking the PCS to forecasting and costing systems.

> "They gave in when Reason realized that a data base system would allow on-line access to the data. We wouldn't have this if we had just tied into Athens' systm, which was a typical batch system."

To save time, they based the PCS on a work in process (WIP) system that had been automated at the Athens Plant in 1971, prior to the formation of the EP division.

> "The management review committee wouldn't buy it (our recommended MRP system). They wanted the system now . . . So they said 'What can you do in one year? We want a production control system by October, 1975!' . . . So we took the logic from the Athens WIP and used it almost intact."

This WIP was streamlined somewhat and adjusted to accomodate conditions at Capital City. The new PCS was up and running by early 1976 at Capital City, but Athens continued to use its old WIP, claiming problems in the new system. The situation was generally ignored. Until the forecasting system was ready, Athens' failure to use the system presented no major problems.

Project review in mid-1976 disclosed that the project team had failed to proceed with developing the forecasting and costing elements

intended to interface with PCS. Instead, the team had continued to work on "operational systems," tackling small enhancements that made PCS easier to use or more useful in the plant production control environment. The review committee believed the team had lost sight of its charter. Reason's information needs were not being addressed; he said:

> "They fed back to us what they were doing, telling us what they wanted to do next. I said, 'where are my needs? I want a management exception report for use by me and the plant managers. I want a tool to help me manage the division better. If we had listened to the system that Capital City proposed, we'd not have been able to do the 3PA. They couldn't get together on it."

Reason's accounting manager, Bob Frisco opened:

> "It was an excellent case of bad communication. I thought I had explained to the project team what I wanted. I wanted my own system for cost and financial analysis that managers could use. But they hadn't made any allowance for this. They had redefined the project in terms of what they did in production control."

The project leader was removed, replaced by Frisco himself, who negotiated with Reason a July, 1977, deadline for completion of the forecasting and costing components of the system. It was at this time that the name 3PA was coined, standing for production, planning and profit analysis.

In July 1977, Frisco reported that programming the remainder of 3PA was slightly behind schedule (but not over budget). The balance of the progress report focussed on the disappointing lack of utilization of the PCS system by the Athens Plant. Wrote Frisco: "The interest is just not there." This lack of interest became an issue later in 1977 when the forecast was "turned on" and Athens' data was discovered to be

inaccurate. Division headquarters had begun to make plans and decisions on the basis of 3PA forecasts once these became available to them. After a while, staffers discovered bad data in the 3PA data base, which they traced to the Athens plant. A phone call or two succeeded in convincing Athens to "clean up" the data, but this sequence had to be repeated several times. A division staffer, sent to investigate the matter, discovered that Athens' pattern of using PCS was unorthodox.

Athens was continuing to maintain its own computerized inventory system, dating back to 1971, as the basis for its internal decision-making. It was entering data into PCS merely to comply with the Division's wishes. The problems in the divisional data base arose because the new system required different update procedures from the old. Naturally, Athens was somewhat more conscientious about the system they used than they were about PCS. Specifically, their old system was updated in a weeky batch run. PCS was designed to be updated nightly, but Athens, when it did so at all, updated the PCS system on the same schedule as its old system.

> "The problems came in with the changes (i.e. modifying the inventory status of a part after taking physical inventory). When there were changes, they only made these to the old system, the one they used. They didn't bother to enter these into the tube, which they never looked at. The IMS data base got more and more out-of-date. But that was never too much of a problem until recently, when we tried to hook up the 3PA forecast with PCS. Before that, every six months or so, in response to complaints from division staff, they'd simply clean out the whole data base and reload it with a picture of the current WIP (work in process), but they never really maintained the data base." (systems person)

Further, Athens continued to perform its production scheduling manually, claiming that the system omitted certain needed computations and failed

to provide the "pinkie report", used by production controllers to identify what parts should be shipped.

At this point, Division Staff were forced to admit that the unexpected had happened. Athens, not Capital City, was resisting a system based on one already in use (and without resistance) at Athens.

> "I don't remember exactly how we solved the problem. I remember telling Frisco that they had six months to start using it or I'd have their systems guys down there start reporting directly to him." (division manager)

In early 1978, a programmer new to Athens, acting on directions from the division,

> "fixed it so that the inventory transactions go directly into the IMS data base and then from there into Athens' old programs. Now they get their old reports, and we get their data. Except for the daily update, they hardly know the difference. The change is transparent to the user." (systems person)

Division staffers called this implementation strategy "pulling the plug on their old systems". And it had the effect of ensuring Athens' compliance without changing Athens' behavior around data entry to the inventory system. But Athens still did not use the computerized scheduling, so headquarters escalated.

> "In the last one and one half to two years, our way of dealing with the problems at Athens was to say, 'by the following date, we expect you to be at such and such a place with the system.' They'd come back to us and say, 'we can't use it, because it doesn't give us what we need! So we went back and gave them the reports they wanted in the format they wanted. But it still wasn't enough!

In early 1979, Division headquarters sent a "fixer" down to Athens.

> "What does (the EP Division staff manager on 'special' assignment) do? Well, you have to see him to appreciate him. He does whatever he needs to do. If he needs to listen, he listens. If he needs to shout, he shouts. He just goes there, and whatever it is that needs to get done, gets done. He's the fixer." (division staff manager)

Shortly thereafter, coincident with a general upturn in business conditions, production controllers in the high volume product lines at Athens started using 3PA's computerized schedules. The production controllers in low volume lines continued to schedule manually.

THE POWER DISSONANCE EXPLANATION OF RESISTANCE

The case of 3PA appears to provide additional, unnecessary support for the results of numerous MIS research studies and the guidelines of conventional wisdom: successful implementation of a MIS, defined in terms of user satisfaction and system acceptance (the opposite of resistance), requires top management support and user participation in the design process. In the case of 3PA, the Division Manager initiated the project, supported it through to completion and initiated corrective actions every time the project appeared to get off course. Further, users were offered the genuine opportunity to participate, including time away from regular work duties; and in spite of persistent problems, 3PA was ultimately declared successful. Therefore, it is tempting to view the case of 3PA as supporting traditional notions of the causes of resistance and traditional prescriptions of how to avoid it and ensure success.

The case of 3PA also, however, offers support for an additional explanation of resistance, based on the concepts of power and politics, which can explain more data and which has implications different from those of the traditional explanation. Consider several problems with the traditional explanation. In the first place, it implies that user participation is sufficient for acceptance. Participation convinces reluctant subordinates to acquiesce, but even more important, ensures that the system designed fits the needs of the participators, thereby overcoming potential resistance and instilling a sense of commitment to the final product. Therefore, MIS practitioners are urged to ensure

user participation. Yet, practitioners cannot ensure participation, but can only offer the opportunity to participate, and the case shows clearly that the opportunity alone is not sufficient. Athens had the same opportunity as Capital City, but did not take it. This leads one to ask whether there is a factor, other than paticipation, which is the real cause of the observed resistance or acceptance. If there is such a factor, it may lead to recommendations for practitioners which do not depend upon things outside their control, as does the recommendation to ensure user participation.

Second, the traditional explanation implies that one factor (Athens' lack of participation) caused Athens' resistance but that a different factor (sustained managerial attention) later caused acceptance. Surely, a simpler explanation would point to the working of a single factor which itself changed or which faced changed circumstances over time, rather than to the operation of two or more different factors at different times. By simplifying the explanation of resistance in this way, more useful recommendations may be possible.

None of this is meant to deny that involving users in the design of an MIS is a useful tactic that can improve the chances of successful implementation. It does imply, however, that the tactic may be inappropriate or unsuccessful in some cases, and that the traditional explanation offers little guidance here, since it prescribes user participation in every case, regardless of the type of system being implemented. An explanation of resistance based on some other factor may, in contrast, provide insight into those occasions when

participation is likely to help. It may, therefore, explain in the case of 3PA why Athens alone did not avail itself of the opportunity to participate offered both to it and to Capital City.

An alternative explanation, which addresses all of these objections, explains resistance to information systems as a lack of consonance between the distribution of power implied by an information system and the distribution of power existing in the organization. Thus, the origins of resistance. Here, power is defined as the ability to get one's way over objections. Thus, the origins of resistance are found, not in the presence or absense of any particular tactic for introducing change, but in the interaction of the substance of the change with its organizational context. Clearly, the power distribution of an organization is not the only substantive dimension which could be changed by the introduction of a system with certain design features. Other dimensions include the task variety, importance and autonomy of middle managers' jobs and social interaction patterns or job-related communication channels. But organizational power structures influence a great deal of the behavior of individuals, groups, and subunits contained in them. Therefore, power structure changes introduced by computer-based systems comprise an efficient and fruitful starting point for identifying the organizational impacts of systems and, hence, the causes of resistance to them.

Computer-based systems can threaten change in the organizational power structure in one or more of three distinct ways, any one of which is alone sufficient to produce resistance of the type observed in the case of 3PA. The first way in which information systems interact with intraorganizational power stems from the use of systems in

decision-making. Implied in the adage "information is power" is the ability of individuals to influence the outcome of decision processes if they control access to information used to define decision criteria or to evaluate alternatives against these criteria. The informational aspects of power are discussed in Pettigrew (1972), and Pfeffer (1981), among others.

An example of the ability of information systems to confer or deny interorganizational power through access to data was given by a staff member of the EP Division.

> "Actually, I remember we were quite surprised when it turned out that Athens opposed the system. We had expected more problems at Capital City. Why? Because at Capital City, old Oscar has been the production controller for twenty years. He keeps all the numbers in his head, and he calls all the shots. No one can argue with him when he says 'we need this' or 'we only have that'. Oscar's vacations are events to be planned for months in advance."

In other words, Oscar had power because he had control over and sole access to data bases containing information about inventory, schedules and deliveries, upon which smooth operation of the plant depended. Power positions like Oscar's are valued by many people and, once attained, are unlikely to be gracefully relinquished to the "imperatives" of progress and automation.

Oscar, for his part, was not insensitive to these issues. When questioned, he explained that his role was to balance the demands of company salesmen against the desires of the plant for smooth running operations, a task which required the exercise of considerable "influence". His original concerns, on learning about the plans for the new system, were that salesmen would have direct access to data which would tell them what the plant was really able to produce. This would

encourage salesmen to ask for more than they actually needed, giving them a safety margin to the detriment of the plant. But then, Oscar explained, he realized that the salesmen would have access only to the data that Oscar entered into the system, an arrangement which differed only in medium from his prior ability to present information in a way that gave him maximum leverage.

> "I got to have my kitty. But you see that number? What is it? A 500? Well, I know that 500 is really a 100. Now, is that a kitty or isn't it?"

Clearly, Oscar lost none of his former power through the introduction of the 3PA system at Capital City, but the example illustrates one way in which systems can work against the perceived self-interests of certain people in an organization. By changing who has access to what information or who has control over key data bases, a management information system can alter power bases, disturbing patterns of communication, influence, decision-making in an organization and consequently altering prestige and status.

The second way in which information systems interact with intraorganizational power stems from the use of systems to change the behavior of individuals and the performance of the organization. For example, a data base may describe the performance of individuals or departments. Access to this data is usually coterminous with the ability to use it for evaluation and to allocate rewards and punishments based on the evaluations. For another example, a data base may describe the state of the organization's productive capacity or of its environment. Access to this data may enable one to define the key problems and opportunities facing the organziation and give one the information necessary to cope with these. If one is sufficiently

convincing about the ability to deal with internal and external uncertainties, one can wield substantial power among colleagues in this way.

Thus, the power to influence individual and organizational performance conferred by specific design features of an information system is virtually analogous to that described by an organization chart. Indeed, many computer-based systems, particularly operational or transaction-oriented systems like accounting systems, production scheduling and control systems and order processing systems, spell out a pattern of authority for control, decision-making and resource allocation which is virtually a miniature organization chart. When the distribution of power and influence embodied in the information system differs from that in the formal structures, the formal structures are challenged. To the extent that computer-based systems succeed in channeling behavior, formal structures will erode. The structural aspects of power are discussed in Crozier (1964) and Hickson et al. (1971), in Conrath and du Roure (1978), Markus (1980) and Markus and Pfeffer (1981), as well as in an extensive literature on the effects of computers on organizational centralization, reviewed in Robey (1977), Pfeffer (1978) and Bariff and Galbraith (1978).

An example of the ability of information systems to confer or deny power through the evaluation and altering of individual and organizational behavior can be found in these words of the Capital City Plant Manager:

> "When I first heard about 3PA, it was described as a <u>divisional</u> need. It could help us make better centralized decisions for the division. The system has some features which relate to centralized control, for example, the forecast. But there are problems with this. The ability

> to track our performance back to the forecast is a nebulous thing. It gets awkward. The problem is that we get evaluated against the forecast Sales makes for us. The fear is that we will be held accountable piece by piece, rather than for just the overall dollar figure. That we don't mind being held accountable for. But if they hold us accountable by the piece, and if Sales doesn't sell exactly the mix they predicted, we're in for it. The fear is that there is a lack of flexibility in the forecast. ?PA is a centralized system, but it can be much more useful to us on a decentralized basis."

The third way in which information systems interact with intraorganizational power is by symbolizing power and by presenting the image of the ability to influence outcomes, regardless of the actual intention or ability to do so. Systems symbolize power through language and tangible accoutrements; they suggest, imply, seem and appear through their names, their terminals, their printouts, their manuals and their proponents, independent of the tasks they accomplish. Secretaries at word processing terminals may be renamed "workstation professionals", but managers may resent the clerical connotations of the same electronic mail terminals in their own offices. A construction engineering firm may automate engineering designs to impress clients; a welfare agency may find that a computerized case tracking system helps convince funding sources that services are provided efficiently even though internal operations do not change (Kling, 1978). The image of physician as healer who treats each unique patient may be shattered by the presence of a system reporting patients' statistical prognoses (Markus and Pfeffer, 1981). The organizational power structure is partially revealed through language and symbols, rituals and ceremonies; computer-based systems, likewise, have symbolic aspects and accompaniments. When the images of systems diverge from those of their organizational

context, the existing structures are affronted. The symbolic aspects of power are discussed in Pfeffer (1981) and applied to information systems in Markus and Pfeffer (1981).

An example of the ability of information systems to confer or deny power symbolically can be found in the objections to 3PA raised by production controllers at Athens. On the surface, these objections dealt with the ability or inability of the system to accomplish its objectives.

> "We can't use the Production Plan as the basis for a forecast, because the Production Plan is based on the PCS. If the inventory (in PCS) is inaccurate, which it is, then the Production Plan is meaningless. Therefore, the forecast is meaningless."

But the PCS was virtually identical to Athens' old inventory system; therefore, the controllers were saying that under both old and new systems, the data, which was their responsibility to maintain, was not accurate. This was not strictly true, as the controllers did have accurate knowledge of inventory positions. But they maintained this knowledge, not through a carefully-kept perpetual inventory, as the new system implied, but by going out to the floor and physically counting whenever the need arose. In their minds, the new system offered the promise (image) of better inventory management without the substance they believed essential to the task, a substance, incidentally, which could be found at Capital City, where a strong, centralized production control group had the resources to use a PCS effectively:

> "I got to have control of the inventory on the floor. I got to know where the product is. You got to have people to police the reports, to correct the 'negatives' which mean you got an error. Today we got to go over to the inventory guy and 'blue sky' it. We say 'this' should probably be a 'that'. At Capital City, they're

> doing really well with 3PA. You want to know why? Because they have a guy running 3PA full-time and runners to go out and check the minuses. They have centralized inventory control at Capital City and proper controls on the data. They have people there to check the job tickets. . . Without support like Capital City has, I'll probably end up keeping my manual records and throwing the 3PA stuff in the trash" (production controller).

Computer-based systems, then, can interact with organizational power structures in three ways, by allocating control over and access to information, by setting up formal structures of performance evaluation and action initiation and by symbolizing certain values or images. From the political perspective, resistance to computer-based systems can occur when a) the information access channels, b) responsibility structures or c) the symbols created by an information system diverge from the channels, structures or symbols of the larger organizational context in which the system is used. Any one of these three sources of system-induced organizational dissonance is sufficient to cause resistance to a system. And resistance can occur independent of user participation and top management support. Users may unwittingly participate in the creation of an organizationally-dissonant system design which they later resist when its implications are felt. Organizationally appropriate designs are frequently adopted willingly regardless of who suggested them or developed the specifications. The presence or absence of implementation tactics like user participation cannot produce accepted or successful systems in and of themselves, but they may be instrumental, in a secondary way, in affecting the degree to which a computer-based system matches or diverges from the organizational power structure.

Armed with this background on the political explanation of MIS implementation, the 3PA case can be analyzed, accounting for the objections to the traditional explanation proposed at the beginning of this section.

POWER ANALYSIS OF THE 3PA CASE

A power analysis of the 3PA case must explain two different sets of behavior: first, why, initially, did Capital City accept the system while Athens resisted it and, second, why did Athens begin using it eventually. Several things should be made clear regarding these points. In the first place, the same system was installed in each plant. Features complained about by Athens' production controllers were also noticed and disliked by those at Capital City, but did not affect their usage of the the system. Further, the system resisted at Athens was nearly identical to another system in use at Athens without evidence of resistance. In the second place, controllers at Athens had successfully resisted several applications of managerial pressure; it is unlikely that their sudden capitulation reflected a direct response to one more edict.

In the preceding section, in the discussion of the structual aspects of power and information systems, 3PA was described as a system which allowed Division Headquarters the ability to monitor, evaluate and reward the performance of the plant managers and to intervene in their operational plans around production and shipping. Thus, the system strongly centralized authority in the division compared to the prior situation in which the plants had been relatively free to act on their own. This lack of consonance between the structural power in the organization and that implied by the system would lead to the prediction that both plants would resist it, but in fact only Athens did. In large measure, this is due the fact that Capital City was able to avoid

substantial power loss with respect to Headquarters, because it had maintained a strong centralized production control function (see Figure 1 and the discussion of informational power). Athens, on the other hand, was not able to avoid a power loss because its centralized production control group had been splintered (by Divisional edict) into four smaller product line groups of one person each (see Figure 2). Embedded as they were in subunits under the influence of product line managers and engineers, the production controllers at Athens were unable to present a united front toward Headquarters and toward their own plant managers and lacked both the image and the actual resources they felt were necessary in their role (see discussion of the symbolic base of power). In summary, then, the 3PA system threatened a loss of power to Headquarters in both plants, but at Capital City, unlike Athens, there were structures in place to minimize this loss.

Perhaps even more important, however, the 3PA system threatened a loss of power for Athens with a corresponding gain in power for Capital City in terms of there relationships with each other. In other words, it can be argued that Capital City had something to gain from centralized managerial control which would reduce Capital City's dependence on Athens. It will be remembered that the Capital City plant was on the downstream side of Athens in the process of producing the parts they jointly manufactured; Capital City received parts from the Athens Plant and finished them. Athens' investment casting technology was highly uncertain and the scrap rate was high. Therefore, it was difficult for Athens to meet the delivery dates it promised Capital City, since many parts had to be reworked. Dependent customers (like Capital City) had little choice but to wait, for there was no substitute

for the capital-intensive operations performed at Athens. In contrast, the nature of Capital City's technology, machining, was such that most of the plant's customers could do it themselves; what they wanted from Capital City was low cost and timely service. On both of these dimensions, the performance of Capital City depended on Athens, who had little incentive to perform in ways favorable to Capital City; Athens was too preoccupied with its own problems which did not include cost and delivery.

From this point of view, the Capital City Plant was dependent on Athens, which gave Athens a favorable power position. In the past, Athens had been able to maintain this advantage by controlling access to information about its progress toward schedules: to have released accurate information would have made Athens vulnerable to pressure from Capital City. The 3PA system, unlike Athens' existing WIP, gave data about the actual progress of Athens toward its production schedules not only to Division Headquarters but also to the Capital City Plant. It was, then, in the interest of Capital City to support a system that would reduce its dependence and in the interests of Athens to resist a system that would decrease its power. This analysis, showing how 3PA altered the existing power balance between the two plants, explains why the identical system was resisted in one plant and accepted in another. It is not that Capital City was insensitive to problems with 3PA such as the lack of the pinkie reports. Rather, this inconvenience was a small price to pay for reducing a fundamental dependence on its sister plant.

The next issue to be addressed by the power analysis is why Athens finally began using 3PA. The obvious answer is that the heat from headquarters became unbearable. But this answer sounds a little

weak in the context of almost two years of ingenious resistance by the production controllers who were required to input the necessary schedules. A more appropriate conclusion seems to be that, in 1970, use of 3PA's production schedules gave production controllers a power advantage that they did not have without 3PA, and that this power advantage had not existed for them in 1978.

This is not as farfetched as it sounds. In 1978, Athens was experiencing an economic slump; volume of business was low, so low that much production scheduling could be done "in the head", given some reasonable estimates of current inventory. Those estimates were formed by going out to the floor and counting, rather than through the use of PCS or its predecessor, the WIP. By early 1979, however, business had picked up considerably, and there was no way to keep track of everything manually. In early 1979, several production controllers at Athens were observed to be using 3PA in direct proportion to the number of products for which they were responsible: frequency and quality of use varied with number of products and volume of business. The system, by giving them the ability to cope with uncertainty, gave them some of the organizational power they had long wanted. (This is the structural aspect of power.)

The 3PA system did not give the production controllers everything they wanted, additional people or additional influence with their plant manager. But when the economic upturn came, they were too busy to worry about it anymore. With the change in business, 3PA became their only way to cope. It is interesting to note that they believed their eventual adoption of the system to be voluntary, and it irritated them that Headquarters took credit for the change of behavior.

> "....Now they think we're using it just to make them feel good. You can't win."

In summary, changing economic conditions changed the context in which the 3PA system was used by production controllers at Athens. Their consequent acceptance of the system cannot, in entirety, be interpreted as a yielding to management influence, but rather as an indication of a change in the informational, structural or symbolic aspects of power which had caused their initial resistance.

IMPLICATIONS

The power dissonance explanation identifies the causes of resistance in the degree to which a system conflicts with the existing power structure in the organization using the system. Systems can conflict with organizational power structures in any or all of three ways: by changing patterns of access to and control over information, by altering formal authority for performance evaluation and responsibility for action initiation, and by symbolizing values and images at odds with those accepted in the organizational culture. And, as the analysis of the 3PA case shows, the power dissonance explanation can account for observed patterns of resistance and acceptance entirely without reference to aspects of the implementation process, whether top management support or user participation tactics are at issue.

Some implications of this perspective of resistance are clear. If the goal of a manager or systems analyst is to introduce a computerized system while avoiding resistance, care should be taken to analyze the organizational context of system use and to ensure that specific details of the system's design match that context along three

dimensions: patterns of access to and control over data, allocation of authority and responsibility for performance evaluation and action-taking and symbolic content. In the cases where this is the goal of managers or system designers, the tactic of user participation can be a valuable way to ensure consonance between system and organization, because users will tend to design into a system current organizational power relationships and cultural values. Less resistance will be likely, not because of the tactic per se, but because the tactic tends to produce organizationally consonant designs. The opposite effect will be achieved, however, if the manager or analyst fails to include some key users, such as those who must enter data into the system, or gives disproportionate weight to the recommendations of users who are trying to improve their own power positions through the design of the new system.

For those who are attempting to make systems that are organizationally consonant, some additional lessons from the 3PA case concern the importance of history. It will be recalled that the power analysis of the case relied on the facts that 3PA altered the traditional power relations between the plants, to Athens' disadvantage, and between the plants and headquarters, in ways with which Capital City but not Athens was able to cope effectively. In the first place, almost all of the data required to perform this power analysis refers to aspects of the histories of the plants prior to their incorporation in the EP Division. It is unlikely that a systems analyst assigned to the 3PA project in 1974 or 1975 would bother to inquire about Athen's status as a private company in 1960 or the plants' history of competitive and antogonistic relations. Even if an analyst knew this history, from long

experience in the company, this is not the sort of data which systems analysts have typically been trained to recognize as important or to incorporate in their designs. Yet, just such information provides the key to the problems encountered.

In the second place, part of Athens' resistance to 3PA is related directly not to the 3PA - PCS implementation effort which was so carefully handled, but to the history of first JHM's, then EP Division's, intervention into the internal workings of that plant, which was a not-so-carefully handled implementation process. One outcome of this process was to break up the strength of Athens' production control function in ways that were inconsistent with the new system substantively, symbolically or both. But these events were, in appearance, unrelated to PCS and 3PA, and a systems analyst would not normally inquire into them or factor them into Systems designs. Yet, these aspects of history were clearly interrelated with the resistance observed.

Thirdly, this organizational history is important, not only for understanding why Athens resisted and Capital City accepted the 3PA system, but also for understanding why Athens did not and Capital City did participate in the system's design. Under the circumstances, beleaguered by economics and by Corporate Headquarters, Athens probably perceived no real opportunity to influence the situation facing them. Capital City on the other hand, had the slack resources and a positive motivation to influence events. It is in the context of the political and economic events preceding an implementation effort that evidence of disposition to participate can be found.

Therefore, the wise systems analyst, designer, or implementor, whether a manager or a technician, will reconstruct a history of organizational events, climates and past "systems" projects which could have some bearing on current implementation efforts. A history, carefully prepared and analyzed from a political perspective, will substantially enhance the ability of the analyst either to produce a system design generating less resistance or to structure a design process that will yield a better design.

The preceding recommendations were based on the assumption that the goal of a manager or systems analyst is to reduce resistance to a new system. Obviously, however, the goals of system implementors will frequently involve making changes in the existing organizational information flows, power channels or value systems, and to follow the preceeding recommendations will not achieve the desired results. In this case, the greater the dissonance between the existing organization and the proposed system, the greater the need for implementation tactics based on power and politics, such as those described in detail by Pfeffer (1981).

Frequently, when political implementation strategies are called for, the use of user participation is as a tactic is strongly counter-indicated, in direct contradiction to much prevailing MIS wisdom. This is so for two reasons. First, if users are given a genuine opportunity to participate, they will try to change the proposed designs in ways which meet their needs to the exclusion of others, which can lead to the failure of managers and systems analysts to achieve their "political" (i.e. requiring change in the three power-related dimensions of the organization) objectives. This can be clearly seen in the process of

designing the 3PA system, where Capital City "took the ball and ran with it" and pursued their objectives for a womb-to-tomb MRP as long as they were in control of the design process. Divisional staff members had repeatedly to bring their own objectives to the attention of the design group and were ultimately forced to take over direct project management to ensure the outcome desired. The ultimate system had a distinct accounting orientation, reflecting the biases of the last project manager and fell far short of Capital City's wishes. In the process, Capital City's plan for an integrated operational production system went to the back burner, where it still simmers. Capital City's plant manager, Dudley, remarked:

> "We were disappointed that the Division would not give us the resources to develop the system we need to run our plant properly. But I would have done the same thing if I were in Reason's place. I would have made sure I got what I wanted out of it first. But we have the beginnings of what we need, and we will get the rest of it, though it may take us twenty years. . . ."

Second, user participation is strongly counter indicated in situations where the dissonance between the organization and the proposed system is great, because people asked to participate under such conditions may rightly feel that they are being manipulated into recommending a solution they would not like; this feeling is likely to generate as much resistance as the disliked solution. Much has been written about the dangers of "pseudo-participation", intended to give people the feeling of participation without the genuine potential to influence substantive outcomes. Cummings and Malloy (1973), for example, have cautioned against using participation as an implementation strategy in climates of low-trust among the parties and when the outcome

of the design process is a foregone conclusion.

When Bob Frisco took over the management of the 3PA project, he declared the impasse he found as "an excellent case of bad communication." Notwithstanding his interpretation, the process of designing the 3PA system represents an excellent case of negotiation. The point is that not that the Capital City-dominated design team misunderstood what Reason and Frisco wanted (different things, incidentally), but that they hoped instead to substitute their own goals for those of the division management team. That Frisco "stopped them cold" is beside the point here. The point is they tried, as will all committed users given a genuine opportunity. True participation is a process of negotiation among users and designers, each attempting to impose his or her a) view of the situation, b) solution to the problem or c) objectives based on self-interests. The danger of opening up a design process through user participation is that some users may succeed in advancing their aims to the detriment of the goals of other groups. The corresponding benefit of true participation is that through the process of design negotiation, parties to the process frequently resign themselves to tradeoffs in costs and benefits. When the system is finally installed, most of the potential resistance has been already worked through, and, if the design phase takes somewhat longer, ease of implementation is the reward.

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